MEASURES OF FARM WORK

Rates of Performance and Time Requirements for
Common Farm Operations and Tasks

By
John H. Sitterley

Department of Agricultural Economics and Rural Sociology

Mimeograph Bulletin No. 221

Ohio State University
and
Ohio Agricultural Experiment Station

October, 1950

MEASURES OF FARM WORK
Rates of Performance and Time Requirements for
Common Farm Operations and Tasks

Table of Contents

MEASURES OF FARM WORK
Rates of Performance and Time Requirements for Common Farm Operations and Tasks

Crop Production Operations

The present day farmer in planning his farm organization and production methods has access to a wide selection of farm equipment, production practices, and techniques. Furthermore, every year brings new machines and improved ways for doing jobs. In choosing from this wide and constantly increasing selection, the influences that an item or set of equipment, a production practice or technique will have on the time and labor involved in doing the job is a major factor to be considered by the farm operator.

To appraise the affect that a machine or production method will have on a particular job, and to determine the total labor needs per year for different plans of operation, rates of performance and time requirements of various tasks under farm conditions are essential. Data assembled herein is an attempt to provide information that can be used in making these estimates.

In 1930, F. L. Morison, collected through 112 of Ohio's Vocational Agricultural Schools 744 schedules on rates of performance of the common farm machine and crop operations then prevailing on Ohio farms. These were summarized and published under the title, "An Average Day's Work on Ohio Farms."

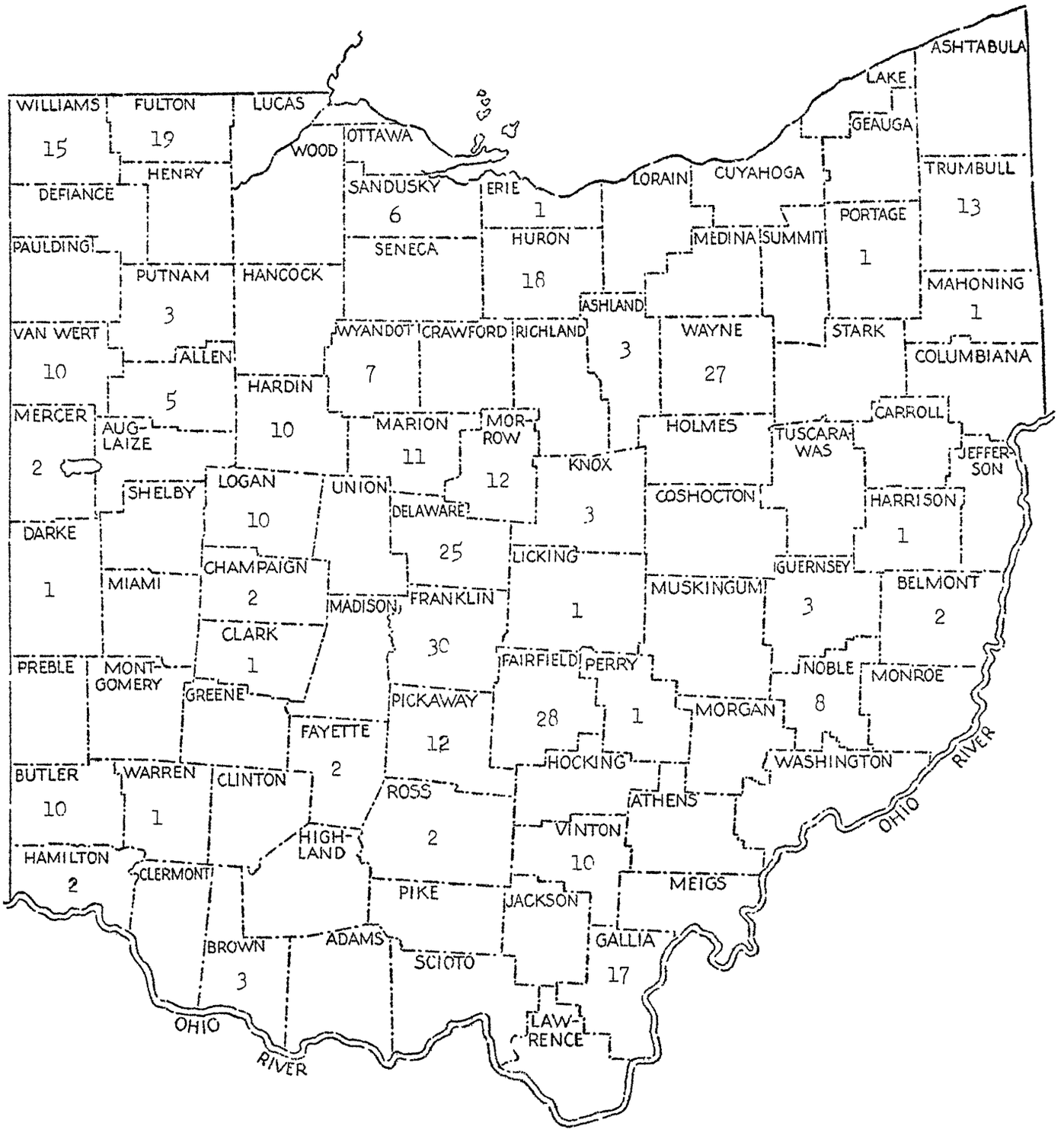
Since 1930, little change has occurred in average hourly accomplishment of horse drawn equipment due either to improvements in, or development of new horse powered machines, or to accelerating the speed of animal power. Consequently, the data assembled at that time on horse drawn equipment and on many of the operations performed with hand labor are still applicable today on farms where horse power is used and where tasks such as cutting and husking corn are performed by hand. In view of this, much of the data

secured in the 1930 study on horse drawn equipment and on hand operations has been included in Parts II & III of this study.

Most of the information assembled in 1930 on tractor powered equipment is no longer applicable. In contrast to horses and horse drawn equipment, tractors and tractor equipment have been greatly altered, improved, and new machines added, making it necessary to assemble new data on rates of performance and time requirements.

Assistance of Ohio's many Vocational, Agricultural and Veteran Training Schools was again solicited, and their cooperation was generously given. During 1948 and 1949, 339 schedules on performance rates were obtained through the schools. The farms on which the data were obtained are widely scattered over the state, (see map, nextpage) with the result that a cross section of the state's soil types, topography, and working conditions are represented. The farms on which performance rates were secured varied in size from less than 50 to more than over 500 acres and averaged 174 acres. Four of the farms had no tractors but hired tractors, 205 had one tractor each, 103 two tractors each, 26 three tractors each, and 1 had four tractors.

The rates of performance and time requirements varied considerably among the farms on which reports were obtained. This variation is caused by differences on farms and farmers. In such operations as soil preparation, soil types, topography, size and shape of fields, depth of tillage, condition of the machine and power units, and the type of operator all affect the amount accomplished per hour. In other operations such as harvesting, yield largely replaces the affect of soil type, and in operations such as storing baled hay in the barn, the equipment, farm arrangement. labor crew and type of operator materially affected the rate. The extent of variation existing among performance rates is indicated by the following analysis of rates of plowing, (Table 1), discing, (Table 2), and picking corn, (Table 3).



Location of Farms Reporting Rates of Performance in 1948 and 1949, by Counties.

Table 1. Plowing Sod Land in Spring with 2-14" plows and a 2 plow Tractor Average Depth 6"-8"

Acres per hour	No. farms reporting	Total hours reported	Total acres reported	Average acres plowed per hr.
Under .45	4	112	35	.31
.45 - .54	18	938	507	.51
.55 - .64	14	676	406	.60
.65 - .74	40	1932	1307	.69
.75 - .84	29	1208	951	.79
.85 - .94	19	689	603	.88
.95 -1.04	15	513	513	1.00
1.05 & over	6	174	211	1.21
Total	145	6292	4533	.72

Table 2. Discing with 7' tandem disc & regular 2 plow tractor

Acres per hour	No. farms reporting	Total hours reported	Total acres reported	Average acres plowed per hr.
.75 - 1.24	8	531	497	.93
1.25 - 1.74	15	362	541	1.49
1.75 - 2.24	34	1166	2329	1.99
2.25 - 2.74	21	716	1786	2.49
2.75 - 3.24	22	703	2080	2.95
Total	100	3478	7233	2.08

Table 3. Picking corn with a 1-row picker and a 2 man crew with the corn cribbed by hand

Acres per hour	No. farms reporting	Total hours reported	Total acres reported	Average yield per acre	Average acre picked per hour
Under .55	10	565	269	62	.47
.55 - .74	17	898	584	53	.65
.75 - .94	11	415	332	56	.80
.95 and over	7	129	130	55	1.01
Total	45	2007	1315	56	.66

Where conditions are favorable for high rates of performance such as large (15 acres or more) rectangular fields with few point rows, good, well adjusted and maintained tractors and machines, together with efficient operators, accomplishments per hour 20 to 25 percent above average are achieved. On the other hand where conditions are unfavorable for fast operation, such as heavy soils, unfavorable topography, small and irregular fields and old and poorly adjusted tractors and machines, performance rates are 25-30 percent below average.

In using the data on rates of accomplishment in estimating the time and labor required to perform a specific task, or to carry out an entire farm plan on a particular farm, consideration should be given to:

a. the texture and structure of the soil

b. the nature of the toooography

c. the size, shape, and layout of fields

d. the condition and adjustment of the power and equipment

e. the speed and efficiency of the operator and labor

When these are typical of conditions found on most farms, the averages reported are a safe guide. If conditions are recognizably less favorable, the rate used in making estimates should be reduced as much as 25 percent. Where the five conditions having the major influence on rates are distinctly better than those prevailing on the typical farm, the rate may be increased as much as 20 percent.

Livestock Chore Work

Livestock production is less readily broken down into distinct parts than crop production. Consequently, little has been done in the past in measuring rates of accomplishments for the different segments such as feeding, watering, bedding, milking, gathering eggs, etc. Instead, time and man labor

requirements have been assembled for the entire task of producing milk, egg, pork, etc. If the process is a continuing one, such as dairying or poultry raising, the data has generally been assembled on an annual basis and expressed in terms of man hours per cow or per hen per year. When the process is a seasonal one, as in the case of cattle and lamb feeding, or the production of replacement chickens, etc., labor and time requirements are expressed in terms of man hours per hundred weight of gain or per 100 birds, etc.. Recently data has been assembled in Ohio by R. H. Baker and R. A. Bailey on time required to perform each of the more distinct jobs involved in milk production. This material is being published by the Ohio Agricultural Experiment Station in a bulletin entitled, "Plan Dairy Chores to Save Labor".

In Part IV an attempt has been made to gather together the most recent data on time and labor requirements involved in the production of the major types of livestock and livestock products. The data has been drawn from published and unpublished cost of production studies in Ohio and other states where livestock production processes are similar to those used by Ohio farmers.

Variation in man hours required per unit of production was as great among the contributing farms as in the case of crop production. Thus, it is desirable when working livestock labor needs for a specific farm to consider the conditions under which the work is performed. When these are typical, the averages presented herein are applicable. Where facilities and equipment involved is distinctly less favorable for speed and ease of doing the chore work, time requirements are increased by as much as 20 percent. Likewise, if conditions are distinctly favorable the time requirements are reduced as much as 20 percent.

Some important factors that affect the labor spent doing livestock chores are:

1. Type and number of animals cared for.

2. Place feed is stored in relation to where it is fed and the type of feeding facilities and equipment.
3. Arrangement of buildings (interior as well as their location in relation to each other).
4. Chore techniques. The order and manner in which specific chore jobs are done.
5. Location and type of watering facilities.
6. Operator's dexterity, skill, age, and strength.

PART I. CROP OPERATIONS WHEN TRACTOR POWER IS USED 1/

Seed Bed Preparation Operations - All Crops.

Operation or type of machine and size	Size of Tractor	Size of Sample Cases	Size of Sample Acres	Man hours per acre	Amount accomplished per hour
Spring Plowing					
Sod land - (Ave. depth 6 to 8 inches)					
1 bottom	1-pl. Tr.	20	294	2.78	.36 acres
2-12" bottoms	light or med. 2-pl. Tr.	59	1416	1.69	.59 acres
2-14" bottoms	med. 2-pl. Tr.	145	4533	1.39	.72 acres
2-14" bottoms	3-pl. Tr.)	20	786	1.15	.87 acres
3-12" bottoms	heavy 2-pl. Tr.)				
3-14" bottoms	3-pl. Tr.	18	980	.92	1.09 acres
Stock, stubble, or bare land (Ave. depth 6 to 8 inches)					
1 bottom	1-pl. Tr.	11	85	2.44	.41 acres
2-12" bottoms	light or med. 2-pl. Tr.	34	717	1.43	.70 acres
2-14" bottoms	med. 2-pl. Tr.	101	3433	1.25	.80 acres
2-14" bottoms	3-pl. Tr.)	11	344	1.15	.87 acres
3-12" bottoms	heavy 2-pl. Tr.)				
3-14" bottoms	3-pl. Tr.	16	580	.90	1.11 acres
Fall Plowing					
Sod land - (Ave. depth 6 to 8 inches)					
2-14" bottoms	med. 2-pl. Tr.	20	369	1.35	.74 acres
Stalk stubble or bare land (Ave. depth 6 to 8 inches)					
2-14" bottoms	med. 2-pl. Tr.	46	1024	1.28	.78 acres
Dragging Plowed Land					
Drag under 8'	med. 2-pl. Tr.	13	251	.51	1.97 acres
Drag 8' to 10.9'	med. 2-pl. Tr.	27	1435	.35	2.87 acres
Drag 11' or more	med. 2-pl. Tr.	7	451	.28	3.55 acres
Discing with Tandem Disc					
Disc harrow - 6'	1-pl. Tr.	10	221	.72	1.38 acres
Disc harrow - 6'	med. 2-pl. Tr.	19	1110	.63	1.58 acres
Disc harrow - 7'	med. 2-pl. Tr.	100	7233	.48	2.08 acres
Disc harrow - 7'	3-pl. Tr.	16	1234	.38	2.63 acres
Disc harrow - 8'	med. 2-pl. Tr.	25	2125	.50	2.00 acres
Disc harrow - 8'	3-pl. Tr.	7	1376	.33	3.01 acres

1/ Based on data secured in 1948 and 1949 from Ohio farmers through the Vocational Agricultural and Veteran Training Schools, except the data on field chopping hay and making grass silage.

Seed Bed Preparation Operations - All Crops (Continued)

Operation or type of machine and size	Size of Tractor	Size of Sample Cases	Size of Sample Acres	Man hours per acre	Amount accomplished per hour
Harrowing					
Spring-tooth	light 2-pl. Tr.	8	306	.61	1.64 acres
Spring-tooth	med. 2-pl. Tr.	31	1321	.40	2.48 acres
Spring-tooth	3-pl. Tr.	5	205	.35	2.85 acres
Spike-tooth under 9'	all sizes	36	1579	.49	2.03 acres
Spike-tooth 9'-10.9'	all sizes	30	1218	.32	3.12 acres
Spike-tooth 11' or more	all sizes	24	1828	.19	5.20 acres
Cultipacking					
Cultipacker 7'	all sizes	20	1011	.45	2.20 acres
Cultipacker 8'	all sizes	20	1198	.42	2.36 acres
Cultipacker 9'	all sizes	9	380	.31	3.22 acres
Rotary Hoeing					
Rotary hoe 2-row (7 ft.)	all sizes	73	3073	.28	3.55 acres
Rotary hoe 3-row (10.5 ft.)	all sizes	12	820	.18	5.49 acres
Fitting Tools Pulled Tandem					
Disc & spike harrow	light 2-pl. Tr.	8	379	.74	1.36 acres
Disc & spike harrow	med. 2-pl. Tr.	52	3288	.51	1.95 acres
Disc & spike harrow	3-pl. Tr.	8	570	.42	2.40 acres
Disc & cultipacker	light 2-pl. Tr.	11	623	.70	1.42 acres
Disc & cultipacker	med. 2-pl. Tr.	59	3496	.47	2.12 acres
Disc & cultipacker	3-pl. Tr.	19	1851	.41	2.46 acres
Disc & drag	med. 2-pl. Tr.	16	661	.57	1.74 acres
Spike harrow & cultipacker	med. 2-pl. Tr.	18	662	.40	2.47 acres
Rotary hoe & cultipacker	med. 2-pl. Tr.	8	382	.31	3.18 acres

Specialized Corn Operations

Operation or type of machine and size			Size of Sample Cases	Size of Sample Acres	Man hours per acre	Amount accomplished per hour
Planting Corn With a Converted Horse Type Planter						
Drilling	2-rows	38" apart	22	713	.77	1.30 acres
Drilling	2-rows	40" apart	42	1383	.68	1.46 acres
Drilling	2-rows	42" apart	36	1095	.68	1.46 acres
Checking	2-rows	40" apart	24	672	.87	1.15 acres
Checking	2-rows	42" apart	14	523	.82	1.22 acres
Planting Corn With Machine Designed for Tractor Power						
Drilling	2-rows	38" apart	7	228	.55	1.82 acres
Drilling	2-rows	40" apart	42	1892	.57	1.75 acres
Drilling	2-rows	42" apart	13	317	.58	1.72 acres
Drilling	4-rows	40" apart	9	411	.25	4.06 acres
Checking	2-rows	40" apart	21	548	.85	1.17 acres
Checking	4-rows	40" apart	4	313	.31	3.22 acres
Cultivating Corn With 2-Row Cultivators. 1/						
Rapid Cultivation						
38" rows		1st cultivation	20	688	.63	1.60 acres
38" rows		2nd & 3rd cultivation	20	865	.46	2.16 acres
40" rows		1st cultivation	47	2339	.55	1.82 acres
40" rows		2nd & 3rd cultivation	47	3123	.37	2.68 acres
42" rows		1st cultivation	28	1094	.49	2.04 acres
42" rows		2nd & 3rd cultivation	28	1508	.36	2.75 acres
Slow Cultivation						
38" rows		1st cultivation	19	562	1.28	.78 acres
38" rows		2nd & 3rd cultivation	19	784	.78	1.29 acres
40" rows		1st cultivation	52	1981	1.09	.92 acres
40" rows		2nd & 3rd cultivation	52	2266	.68	1.48 acres
42" rows		1st cultivation	34	846	1.03	.97 acres
42" rows		2nd & 3rd cultivation	34	1293	.58	1.71 acres

1/ The farms reporting were about equally divided between two groups, the one group cultivated slowly using a low gear on their tractor, the other group cultivated faster by using higher gears on their tractor.

Specialized Corn Operations (Continued)

Operation or type of machine and size	Size of sample Cases	Acres	Ave. yield per A.	Man hours per acre	Amount accomplished per hour
Picking Corn					
One row machines - corn unloaded by hand					
1-man crew	11	309	57 bus.	3.06	.33 acres 18.6 bus.
2-man crew	45	1314	56 bus.	3.05	.65 acres 36.6 bus.
3-man crew	23	737	61 bus.	3.85	.78 acres 47.4 bus.
4-man crew	14	437	56 bus.	5.56	.72 acres 40.3 bus.
Average all crews (2.27 men)	93	2797	57 bus.	3.65	.62 acres 35.6 bus.
One row machines - corn unloaded with an elevator					
Average all crews (2.06 men)	29	1011	69 bus.	3.75	.53 acres 37.4 bus.
Two row machines - corn unloaded by hand					
3-man crew	19	610	48 bus.	2.39	1.25 acres 60.0 bus.
4-man crew	19	713	63 bus.	3.21	1.25 acres 81.9 bus.
Average all crews (3.03 men)	51	1786	55 bus.	2.77	1.09 acres 59.7 bus.
Two row machines - corn unloaded with an elevator					
3-man crew	16	740	52 bus.	2.61	1.14 acres 60.0 bus.
Average all crews (3.13 men)	26	1273	59 bus.	2.92	1.07 acres 63.7 bus.
Putting Corn in Silo				Man hours per ton	
Field chopper & blower					
Average all crews (5.5 men)	18	217	8.1 tons	.96	.70 acres 5.7 tons
Corn binder & ensilage cutter					
6 men or less (3.7 men)	21	132	7.1 tons	1.86	.28 acres 2.0 tons
7 to 10 inclusive (8.8 men)	52	391	7.7 tons	1.48	.76 acres 5.9 tons
11 men or more (13.7 men)	36	270	8.0 tons	2.04	.83 acres 6.7 tons

Specialized Small Grain and Soybean Operations

Operation or type of machine and size	Size of Sample Cases	Size of Sample Acres	Man hours per acre	Amount accomplished per hour
Drilling small grain or beans and fertilizer				
5' drills	15	385	.97	1.03 acres
6' & 6½' drills	57	1690	.76	1.31 acres
7' & 7½' drills	141	5118	.61	1.63 acres
8' drills	27	1051	.56	1.80 acres
10' drills	31	1713	.47	2.14 acres
Ave. all sizes (7.2' per drill)	271	9957	.62	1.61 acres
Drilling small grain or beans without fertilizer				
6' & 6½' drills	16	334	.60	1.66 acres
7' & 7½' drills	49	1394	.46	2.17 acres
Ave. all sizes (7.3' per drill)	82	2298	.49	2.05 acres

Size of combine and way grain disposed of	Size of sample Cases	Size of sample Acres	Ave. size crew (men)	Ave. man hours per A.	Amount accomplished per hour
Combining wheat, (average yield 25.4 bu.)					
5' cut, 80% or more stored on farm	20	443	2.22	2.41	.92 A 20 bu.
5' cut, 80% or more sent to elevator	24	634	2.01	2.16	.93 A 21 bu.
5' cut, all types of disposal	62	1610	2.14	2.42	.89 A 22 bu.
6' cut, 80% or more stored on farm	38	989	2.41	2.29	1.05 A 27 bu.
6' cut, 80% or more sent to elevator	33	1120	2.35	2.23	1.05 A 28 bu.
6' cut, all types of disposal	92	2823	2.40	2.23	1.07 A 28 bu.
7' & 8' cut, (Ave. 7.6') all types of disposal	16	518	2.59	1.74	1.48 A 37 bu.
Combining oats, (average yield 48.9 bu.)					
5' cut, mostly stored on farm	45	886	2.07	2.41	.86 A 43 bu.
6' cut, mostly stored on farm	64	1283	2.28	2.23	1.02 A 46 bu.
7' & 8' cut, (Ave. 7.6') mostly stored on farm	11	258	2.34	1.80	1.30 A 52 bu.
Combining soybeans, (average yield 21.9 bu.)					
5' cut, mostly hauled to elevator	29	765	1.90	2.32	.82 A 19 bu.
6' cut, mostly hauled to elevator	40	1022	2.12	2.18	.97 A 22 bu.

Specialized Hay Operations

Operation or type of machine and size	Size of Sample Cases	Size of Sample Acres	Man hours per acre	Amount accomplished per hour
Cutting heavy hay				
With a converted horse type mower				
5' mower	41	978	.91	1.1 acres
6' mower	54	1227	.83	1.2 acres
With a mower designed for tractor power				
6' mower	21	431	.71	1.4 acres
7' mower	89	2617	.48	2.1 acres
Cutting light hay, stubble or pasture				
With a converted type mower				
5' mower	27	510	.83	1.2 acres
6' mower	37	985	.67	1.5 acres
With a mower designed for tractor power				
6' mower	17	503	.67	1.5 acres
7' mower	73	3218	.42	2.4 acres
Raking & turning hay	208	--	.35	2.85 acres

Operation or type of machine and size	Number of cases	Clock hours worked per day	Loads hauled per day	Lbs. per load hauled	Man hours per ton	Amount accomplished per hour
Moving loose hay from windrow and storing it in barn						
Wagon & loader (hay fork used in barn)						
2-man crew	28	7.25	5.57	1972	2.64	.76 tons
3-man crew	32	7.59	6.35	2282	3.14	.96 tons
4-man crew	17	7.32	7.61	2197	3.50	1.14 tons
Wagon & loader (slings used in barn)						
All crews (ave. size 2.7 men)	24	7.25	6.62	2308	2.64	1.05 tons
Buck rake (hay fork used in barn)						
All crews (ave. size 2.6 men)	9	7.00	18.5	760	2.52	1.00 tons
Buck rake (slings used in barn)						
All crews (ave. size 3.5 men)	16	7.37	28.7	861	2.10	1.67 tons

Specialized Hay Operations (Continued)

Operation or type of machine	No. of cases	Tons per case	Size of crew of men	Bales No. per hour	Lbs. per bale	Man hrs. per ton	Amount accomplished per hour
Moving loose hay from windrow and storing it in barn (continued)							
Baling only (Ave. time reported suitable for baler operator per day - 7.8 hrs.)							
Hand tie baler	29	48.6	3.27	61.3	69.8	1.64	2.14 tons
Automatic baler	47	48.2	1.38	81.5	58.0	.62	2.40 tons
Storing baled hay when loaded direct from baler							
Put in barn with elevator	21	76.7	3.8	77.2	61	1.61	2.35 tons
Put in barn with rope arrangement	9	56.8	3.4	56.8	74	1.63	2.11 tons
Put in barn by hand	11	36.3	3.1	52.6	59	1.98	1.55 tons
Average of all 3 methods	41	61.5	3.56	67.7	63	1.67	2.13 tons
Storing baled hay when picked up off of the ground							
Average of elevator, rope and hand methods of unloading	33	41.5	3.05	48.3	65	1.95	1.56 tons
Field chopper, wagons, stationary blower							
Illinois review of studies) made in 6 midwest states) (1)			3.7	--	--	1.4	2.5 tons

	No. of cases	Acres per farm	Tons per farm	Man labor per ton of silage
Grass silage (cut, rake, haul & store) - New York study (2)				
Field chopper	14	18	135	1.2 hours
Stationary chopper	20	24	156	1.4 hours

(1) R. H. Wilcox "A Comparison of Different Haymaking Methods," Illinois Farm Economics No. 155, 1948, University of Illinois, Urbana, Illinois.

(2) R. G. Murphy "Costs in Harvesting Grass Silage," Farm Economics No. 166, 1949, Cornell University, Ithaca, New York.

Miscellaneous Machine Operations

Loading and spreading manure with tractor powered loader

Size of crew	Number of spreaders	No. of reports	Ave. distance to field	Man hrs. per load	Amount accomplished per hour
2-man crew	2/3 had 2, 1/3 had 1	42	77 rds.	.49	4.4 loads
3-man crew	2	59	66 rds.	.54	5.6 loads
4-man crew	3	21	83 rds.	.51	7.8 loads

PART II. CROP OPERATIONS WHEN HORSE POWER IS USED 1/

Seed Bed Preparation Operations - All Crops

Operation or type of machine and size		No. of horses	No. of farms reporting	Man hours per acre	Amount accomplished per hour
Spring Plowing					
Walking plow	12" bottom	2	189	6.3	.16 acres
Walking plow	14" bottom	2	181	5.9	.17 acres
Sulky plow	14" bottom	3	225	4.5	.22 acres
Gang plow	2-14" bottoms	4	35	2.4	.41 acres
Fall Plowing					
Walking plow	12" bottom	2	101	6.7	.15 acres
Walking plow	14" bottom	2	94	6.3	.16 acres
Sulky plow	14" bottom	3	104	4.8	.21 acres
Gang plow	2-14" bottoms	4	14	2.5	.40 acres
Dragging plowed land					
Drag 6 to 7 ft.		2	57	1.1	.92 acres
Drag 8 to 9 ft.		2	70	.95	1.05 acres
Drag 8 to 9 ft.		3	45	.81	1.23 acres
Discing					
Single disc	6 ft.	2	73	1.4	.74 acres
Double or tandem disc	7 ft.	4	63	1.01	.99 acres
Harrowing					
Springtooth 6 - 7 ft.		2	58	1.3	.76 acres
Springtooth 6 - 7 ft.		3	65	1.02	.98 acres
Spiketooth 8 - 9 ft.		2	105	.89	1.12 acres
Spiketooth	10 ft.	2	94	.76	1.32 acres
Spiketooth	10 ft.	3	108	.65	1.53 acres
Rolling					
Roller 8 ft.		2	109	.73	1.36 acres
Cultipacking					
Cultipacker 8 ft.		2	52	.81	1.23 acres

1/ Based on data secured in 1930 by F. L. Morison through the Vocational Agricultural Schools.

Specialized Corn Operations

Operation or type of machine and size		No. of horses	No. of farms reporting	Man hour per acre	Amount accomplished per hour
Planting corn					
Checking	2 rows	2	469	.89	1.12 acres
Drilling	2 rows	2	314	.81	1.24 acres
Cultivating					
1 horse cultivator	½-row	1	146	2.8	.35 acres
Walking cultivator	1-row	2	116	1.7	.58 acres
Riding cultivator	1-row	2	590	1.5	.65 acres
Riding cultivator	2-row	3	88	.77	1.30 acres
Rotary hoeing					
Rotary hoe	2-row	2	42	.72	1.38 acres
Cutting corn					
Binder	1-row	2	198	1.6	.61 acres
Binder	1-row	3	130	1.5	.68 acres
Filling silo (excluding cutting)				per ton	
Average crew 9 men		8	130	1.4	6.3 tons
Husking corn					
Shredder 4 roll	7 men	6	84	--	30.3 bushels
Shredder 6 roll	8 men	8	105	--	40.8 bushels

Specialized Small Grain Operations

Operation or type of machine and size	No. of horses	No. of farms reporting	Man hours per acre	Amount accomplished per hour
Drilling grain & fertilizer				
Drill 6 ft.	2	180	1.1	.88 acres
Drill 7 ft.	2	159	1.03	.97 acres
Drill 8 ft.	2	95	.93	1.08 acres
Drilling grain - no fertilizer				
Drill 6 ft.	2	73	1.1	.95 acres
Drill 7 ft.	2	74	.93	1.07 acres
Drill 8 ft.	2	23	.77	1.30 acres
Harvesting grain (cutting only)				
Binder 6 ft.	3	128	1.1	.91 acres
Binder 7 ft.	3	241	.93	1.08 acres
Binder 8 ft.	4	50	.69	1.45 acres
Threshing wheat from shock				
22" to 26" cyl. crew 12 men	8-10	94	--	64.4 bushels
28" to 30" cyl. crew 13 men	10-12	134	--	83.4 bushels
Threshing oats from shock				
22" to 26" cyl. crew 12 men	8-10	102	--	106 bushels
28" to 30" cyl. crew 13 men	10-12	121	--	140 bushels

Specialized Hay Operations

Operation or type of machine and size	No. of horses	No. of farms reporting	Man hours per acre	Amount accomplished per hour
Cutting hay				
Mower 5 ft.	2	309	1.2	.80 acres
Mower 6 ft.	2	320	1.0	.97 acres
Tedding hay				
Tedder 8 ft.	2	69	.72	1.38 acres
Tedder 10 ft.	2	129	.58	1.72 acres
Raking hay				
Sulky rake	1	66	.69	1.44 acres
Sulky rake	2	212	.63	1.59 acres
Side delivery rake	2	242	.63	1.59 acres
Loading hay with loader & unloading with mechanical fork				
2-man crew	2	112	--	.79 loads
3-man crew	2	86	--	.88 loads
3-man crew	4	42	--	.98 loads

Miscellaneous Horse Drawn Machine Operations

			per load	
Haul & spread manure				
Spreader 1-man crew	2	178	.79	1.26 loads
Spreader 2-man crew	2	272	1.03	1.95 loads
			per acre	
Spreading lime (Ave. 1.6 tons per acre)				
Drill 10 ft.	2	45	1.02	.98 acres
Drilling fertilizer				
Drill 7 ft.	2	53	1.03	.97 acres
Planting potatoes				
Planter 1-row	2	68	2.4	.42 acres
Digging potatoes				
Plow	2	103	6.3	.16 acres
Digger 1-row	2	62	4.3	.23 acres

PART III. CROP & MISCELLANEOUS OPERATIONS PERFORMED BY HAND 1/

Operation	No. of farms reporting	Man hours per acre	Amount accomplished per hour
Planting corn			
Hand planter	26	2.1	.48 acres
Cutting & shocking corn			
1 man crew	455	7.1	.14 acres
Cutting & shocking corn with sled or platform cutter			
2 man crew and 1 horse	48	2.1	.47 acres
Shocking corn after a corn binder			
2 man crew	232	1.5	.66 acres
Husking and cribbing from standing stalk			
1 man crew and 2 horses	130	--	5.63 bushels
Husking corn out of shock			
1 man crew	479	--	3.68 bushels
Cribbing corn when husked out of shock			
40 bu. wagon box, 1 man and 2 horses	242	--	15.3 bushels
Shocking wheat after binder			
1 man crew	559	1.4	.69 acres
Shocking oats after binder			
1 man crew	561	1.3	.74 acres
Cocking hay			
1 man crew	101	3.2	.31 acres
Loading & unloading hay by hand			
2 man crew 2 horses	70	--	.61 loads
Cutting seed potatoes			
1 man crew	375	--	1.77 bushels
Planting potatoes			
1 man crew	125	7.7	.13 acres
Hoeing potatoes			
1 man crew	235	8.3	.12 acres
Digging potatoes with fork			
1 man crew	100	33.3	.03 acres

1/ Based on data secured in 1930 by F. L. Morison through the Vocational Agricultural Schools, except that on fence building.

PART III. CROP & MISCELLANEOUS OPERATIONS PERFORMED BY HAND (Continued)

Operation	No. of farms reporting	Man hours per acre	Amount accomplished per hour
Picking potatoes			
1 man crew	355	--	6.2 bushels
Loading & spreading manure with fork			
1 man crew 2 horses	115	--	.87 loads
Sowing grass seed - knapsack seeder			
1 man crew	360	.40	2.55 acres

Operation	Size of Sample		Amount accomplished per hour
	Cases	Rods built	
Building permanent type fence *			
Holes hand dug, post set, ave. 14.7' apart	60	4347	1.45 rods
Posts hand driven, ave. 15.2' apart	41	4644	2.01 rods
½ hand dug, ½ driven, ave. 15.9' apart	24	2560	1.87 rods

* Based on data secured in 1948-1949 from Ohio farmers through the Vocational Agricultural and Veteran Training Schools.

PART IV. LIVESTOCK CHORE LABOR REQUIREMENTS 1/

Dairy Enterprise

Milking Herd - (Operated under "typical conditions" with regard to equipment, building arrangement and chore labor management).

Method of milking	Size of cow herd	Ave. No. cows	No. of herds	Man hrs. per yr. per cow in milking herd
Ohio Study (1)				
Hand	Under 10	8.0	33	212
Hand	10 - 17.9	12.4	21	192
Machine	Under 10	8.9	31	165
Machine	10 - 17.9	14.0	80	117
Machine	18 - 21.9	19.6	34	97

Milking Herd - (Operated under "highly efficient conditions" with regard to equipment arrangement of work places and well planned chore methods).

Type of barn	Size of herd	Man hours per yr. per cow in milking herd
Ohio Study (1)		
Stanchion barn	12 cows	81
	16 cows	75
	20 cows	72
	24 cows	69
Milking parlor Loafing pen barn	12 cows	78
	16 cows	71
	20 cows	67
	24 cows	64
Michigan Study (4)		
Stanchion barn	20 - 30 cows	75
Milking parlor loafing pen barns	20 - 50 cows	60

1/ Based on data contained in various research studies carried on in Ohio and other states through the Agricultural Colleges and Experiment Stations. Source of data given in footnotes.

	No. of records	Ave. No. animals per record	Man hours per yr. per animal
Replacement Animals. (Calves, yearlings, etc.)			
Indiana (2)	192	12.6	18.8
Michigan (3)	285	12.5	17.4
Veal Calves. (Ave. days kept 16.1)			
Indiana (2)	88	9.5	2.3
Dairy Bull			
Indiana (2)			
Bull pastured	44		42
Bull not pastured	47		62
Michigan (3)			
Ave. of all methods	285		85

(1) R. H. Baker, Agricultural Economics Dept., Ohio Agricultural Experiment Station and Ohio State University unpublished data.

(2) L. Robertson, L. E. Slater, and V. C. Manhart, "Dairy Costs and Returns in Northwestern Indiana." Bul. 481, 1942, Purdue University and Agricultural Experiment Station, Lafayette, Indiana.

(3) E. H. Carter, K. T. Wright, W. H. Vincent, "Dairy Costs and Returns in Detroit Milk Shed," FM 397, 417 and 434 - 1945-47, Michigan State College and Agricultural Experiment Station, East Lansing, Michigan.

(4) L. H. Brown, B. F. Cargill and B. R. Bookhout, "Pen Type Dairy Barns," Special Bul. 363, 1950, Michigan State College and Agricultural Experiment Station, East Lansing, Michigan.

Hog Enterprise

Two litter system. Indiana study (1)

Size of enterprise Herds	Ave. No. sows	No. of farms	Cwt. of pork produced	Man hours per cwt. of pork produced	Total man hrs. per sow kept	Distribution of tot. man hrs. per sow, by production phases 2/ gestation	farrowing	suckling	weaning to mrkt.
Small	8.1	10	239	2.58	68	11.5	15.0	11.5	30.0
Medium	15.0	10	429	1.82	52	8.9	11.4	8.9	22.8
Large	30.8	10	833	1.20	32	5.4	7.0	5.5	14.1

One litter system. Indiana study (1)

Size of enterprise Herds	Ave. No. sows	No. of farms	Cwt. of pork produced	Man hours per cwt. pork produced	Total man hours per sow kept
Small	10.1	14	153	2.22	30.9
Medium	20.5	13	292	1.35	19.3
Large	55.5	13	804	1.04	13.4

(1) L. S. Hardin, Agricultural Economics, Purdue University, unpublished results from a 1950 swine enterprise study.

2/ Based on unpublished data supplied by L. S. Hardin, Purdue University.

Poultry Enterprise

Small Farm Flock (Including replacements kept primarily for home use, birds allowed considerable range) Illinois Study (1)

	Man hrs. per year for layer and replacements per mature bird kept
Farm flock	2.8

Semi-Commercial Flock (Average of all birds) Indiana Study (2)

	Size of flock	Man hrs. per year per layer
Laying flock	Under 300, ave. 208	2.5
	300-599, ave. 420	2.1
	600 or more, ave. 1127	1.9
		Man hours per chick started
Replacement flock	Sexed pullet chicks	.32
	Straight run chicks	.24

Commercial Flock New York Study (3)

	Size of flock	Man hrs. per year per layer
Laying flock All breeds	Under 700, ave. 530	2.9
	700-1299, ave. 931	2.3
	1300 or more, ave. 2114	2.1
Replacement flock		Man hours per chick started
Light breeds	Sexed pullet chicks	.44
	Straight run chicks	.24
Heavy breeds	Sexed pullet chicks	.48
	Straight run chicks	.33

Commercial Broilers Arkansas Study (4)

	Man hours per broiler started
Fed 14 weeks, ave. wt. when sold 3.2 pounds	.34

Poultry Enterprise (Continued)

Turkeys Illinois Study (5)

	Man hours per bird sold
Birds sold (ave. wt. 18.5 pounds)	.71

Footnotes Poultry Enterprise

(1) H. R. Wilcox and L. E. Card, "Poultry Costs and Profits," Bul. 486, 1942, University of Illinois and Agricultural Experiment Station, Urbana, Illinois.

(2) J. W. Oberholtzer, "An Economic Study of Semi-Commercial Egg Farms in North Central Indiana," Bul. 486, 1943, Purdue University and Agricultural Experiment Station, Lafayette, Indiana.

(3) L. B. Darrah, "Factors that Affect Incomes on Commercial Poultry Farms 1940-41," Bul. 803, 1943, Cornell University and Agricultural Experiment Station, Ithaca, New York.

(4) W. T. Wilson and R. M. Smith, "Broiler Production and Marketing in North Western Arkansas," Bul. 412, 1941, Arkansas Agricultural Experiment Station, Fayetteville, Arkansas.

(5) R. H. Wilcox and L. E. Card, "Turkey Production Costs in Illinois, 1946," Bul. A.E.-2464 Agricultural Extension Service, University of Illinois, Urbana, Illinois.

Beef Enterprise

	No. of farms	Units per farm	Pasture days	Man hrs. per yr. per unit
Brood Cow and Calf to Weaning (Commercial herds)				
New York (1)	42	14	180	16.0 per cow
Michigan (2)	17	31	203	10.5 per cow
Kentucky (3)	15	22	248	12.2 per cow
Herd Bull				
Michigan (2)	17	1.8	--	13.5 per bull
Replacement Animals				
Michigan (2)				
Weaning to 1 yr. old	9	18	--	3.1 per calf
Yearlings (1 to 2 yrs.)	9	18	--	7.2 per heifer

Fattening Feeder Cattle in Dry Lot

	Animals included in studies	Man hrs. per cwt. gain
Illinois (4)	1558	4.0
Michigan (2)	351	3.9

(1) W. M. Curtiss and J. I. Miller, "Beef Cattle on Some New York Farms," Farm Economics No. 130, 1942, Cornell University, Ithaca, New York.

(2) K. T. Wright, "Beef Costs and Returns," Farm Management 416 and 435, 1947 and 1948, Michigan State College, East Lansing Michigan.

(3) W. L. Rouse and Geo. B. Byers, "Production Requirements for Crops & Livestock in the Blue Grass Region of Kentucky," Bul. 383, 1938, Kentucky Agricultural Experiment Station, Lexington, Kentucky.

(4) H. C. M. Case & K. H. Myers, "Cattle Feeding in Relation to Farm Management," Bul. 261, Illinois Agricultural Experiment Station, Urbana, Illinois.

Sheep Enterprise

	No. of farms	Units per farm	Man hours per yr. per unit
Breeding Flock (Including lambs to weaning)			
Ohio (1)	9	21	6.2 per ewe or ram
Kentucky (2)	12	30	5.4 per ewe or ram
Indiana (3)	17	37	8.4 per ewe or ram
Fattening Feeder Lambs			Man hours per cwt. of gain
U.S.D.A. (4)			7.9

(1) J. F. Dowler, "Variations in Livestock Production Costs and Returns in Putnam County," Bul. 495, 1931, Ohio Agricultural Experiment Station, Wooster, Ohio.

(2) W. L. Rouse & Geo. B. Byers, "Production Requirements for Crops and Livestock in the Blue Grass Region of Kentucky," Bul. 383, 1938, Kentucky Agricultural Experiment Station, Lexington, Kentucky.

(3) L. S. Hardin & F. H. Lacy, Jr., "Livestock Production Costs on 40 Indiana Farms," Station Circular 334, 1948, Purdue University and Agricultural Experiment Station, Lafayette, Indiana.

(4) "Labor Requirements for Crops & Livestock," F.M. 40, 1943, U.S.D.A., Bureau of Agricultural Economics.

Horse Enterprise

	No. of farms	Man hours per year per horse
Draft Animals		
New York (1)	71	98
Arkansas (2)		
1-2 head per farm		100
8 head or more per farm		35
Average of all farms		75

(1) P. S. Williamson, "Costs & Returns from Farm Enterprises from 82 Cost Account Farms, 1937," Bul. 395, 1938, Cornell University and State College of Agriculture, Ithaca, New York.

(2) M. W. Slusher & W. T. Wilson, "Labor & Power Used on Arkansas Crops & Livestock," Bul. 456, 1945, Agricultural Experiment Station, Fayetteville, Arkansas.

APPROXIMATE MONTHLY DISTRIBUTION OF ANNUAL LABOR REQUIREMENTS FOR SELECTED LIVESTOCK ENTERPRISES

Month	Percent of total annual requirements					
	Layers & replacements	Dairy Cows & replacements	Beef breeding herd & replacements	Hogs - 2 litter system	Sheep breeding flock	Horses
Jan.	7.0%	9.5%	13.0%	7.0%	11.0%	6.5%
Feb.	7.0	9.5	13.0	7.0	12.0	6.5
Mar.	11.0	9.5	15.0	14.0	22.0	8.5
Apr.	12.0	9.5	18.0	11.0	18.0	8.5
May	12.0	8.5	5.0	7.0	5.0	10.0
June	8.5	7.5	3.0	5.5	4.0	10.0
July	7.5	7.0	3.0	6.0	3.0	10.0
Aug.	6.5	6.5	3.0	7.0	3.0	8.5
Sept.	6.5	6.5	3.0	12.0	3.0	9.0
Oct.	8.0	7.0	3.0	9.5	3.0	9.0
Nov.	7.0	9.5	8.0	7.0	5.0	7.0
Dec.	7.0	9.5	13.0	7.0	11.0	6.5
Total	100.0	100.0	100.0	100.0	100.0	100.0